REMARKS

Summary of the Office Action

In the Notice to File Corrected Application Papers, Figures 1 through 6 were objected to as containing excessive test under 37 C.F.R. §§ 1.121 and 1.84.

Response to Office Action

Amendments to the Drawings:

Annotated marked-up Drawings and Replacement Sheets for Figures 1, 2A, 2B, 3A through 3Q, 4, 5, 6A and 6B, complying with 37 C.F.R. § 1.84, are submitted in the Appendix. The Applicants respectfully request the Examiner's approval of the replacement drawings. No new matter is added.

Amendments to the Specification:

The Applicants have amended the specification to incorporate the text removed from Figures 1, 2A, 2B, 3A through 3Q, 4, 5, 6A and 6B. No new matter is added. The incorporated text, from original Figures 1-6, corresponds to amendments to the specification as follows:

Specification page and line	Original Figure No.
Page 8, lines 10-11	Figures 3(a)– 3(q)
Page 12, lines 15-23	Figure 1
Page 13, line 28-Page 14, line 8	Figure 1
Page 14, lines 18-22	Figure 1
Page 16, lines 16-20	Figure 2
Page 26, lines 3-10	Figure 3
Page 27, line 11	Figure 4
Page 27, lines 11-19	Figure 5

The remaining amendments to specification correct the Figure numbering to the correct format as required by 37 C.F.R. § 1.84(u). The Applicants respectfully request the Examiner's approval of the amendments to the specification.

CONCLUSION

In view of the foregoing amendments and remarks, the Applicants respectfully request the approval of the replacement drawings and amendments to the specification. The Commissioner is hereby authorized by this paper to charge any fees due in connection with the filing of the response to Deposit Account No. **50-0310**.

Respectfully submitted,

4/1/04
Date

By: _____

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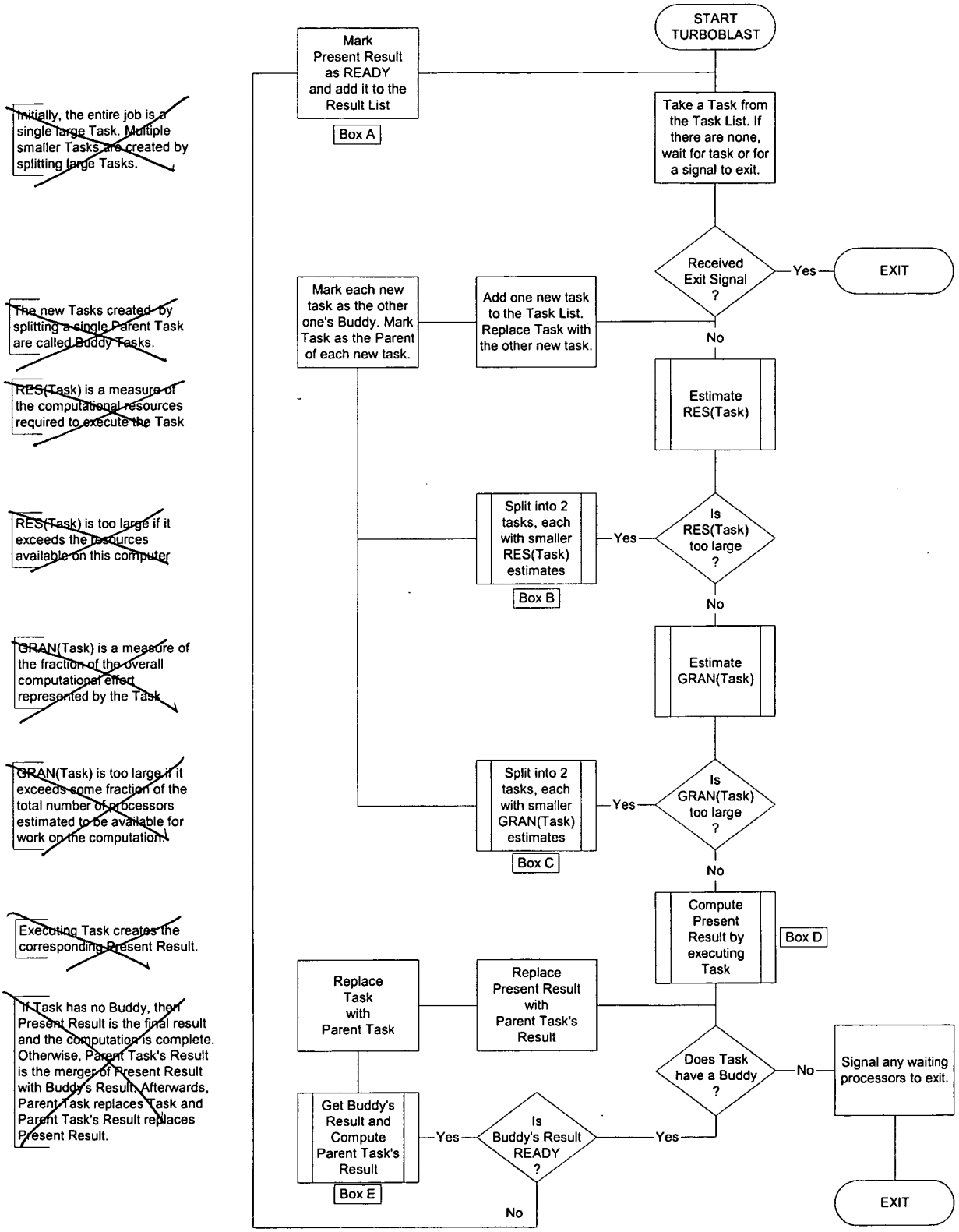
Annotated Marked Up Drawings

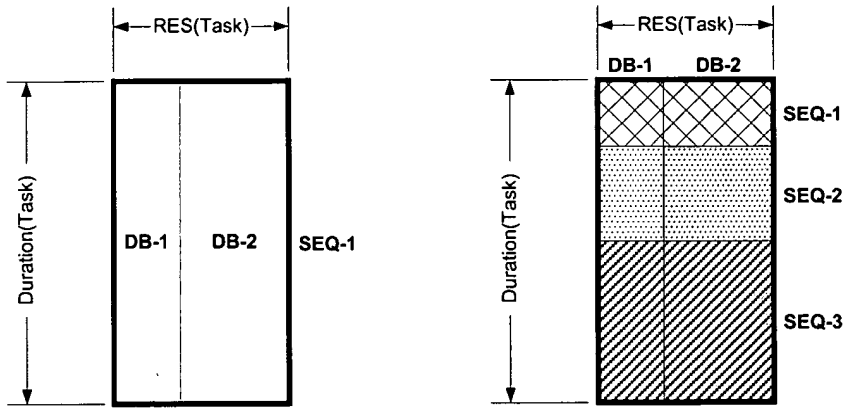
~~Figure 1: Flow Chart~~



Annotated Marked Up Drawings

~~Figure 2~~

~~Rectangular Representation of Searching Tasks~~



(a) ~~Representation of one Task searching~~ a single ~~sequence~~ against 2 databases

(b) ~~Representation of one Task~~ searching 3 ~~sequences~~ against 2 ~~databases~~

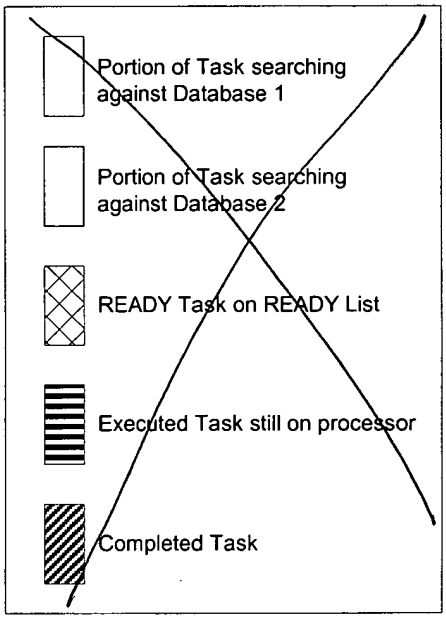
Annotated Marked Up Drawings

Figure 3 (Part 1 of 7)

Detailed Illustration of Method Applied to a Searching Task

Legend

Each of the lettered subfigures (3(a) through 3(q)) shows the representation of the entire searching task at a particular time point during a sample operation of the method of the invention when run on two processors. In addition to the representation of the tasks, each part of Figure 3 also shows the contents of 2 important lists on the bulletin board (i.e., the Task List and the Result List) and indicates the current activities for each of the two participating processors at the corresponding instant of time. The processor activities are correlated with Figure 4, which illustrates the details of the processor activity and includes a time line that is correlated to the subfigures of this figure. The information below describes the markings used throughout Figure 3, and it describes the Task naming convention used in both figures.



Task Naming: The Entire Task is "Task 1".

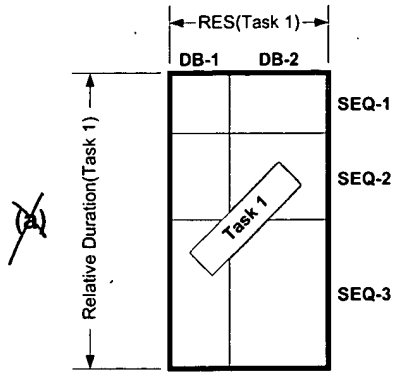
Tasks created by splitting larger divisions are denoted by names using dotted notation in which either the Parent Task's name is extended with a period (".") followed either by a capital letter or an Arabic numeral.

Capital letters are used when vertical splitting is performed based on RES(Task), as when Task 1.A and Task 1.B denote the two tasks created by subdividing Task 1.

Arabic numerals are used when horizontal splitting is performed based on GRAN(Task), as when Task 1.A.1 and Task 1.A.2 denote the two tasks created by subdiving Task 1.A.

Annotated Marked Up Drawing

~~Figure 3 (Part 2 of 7)~~



~~(a)~~

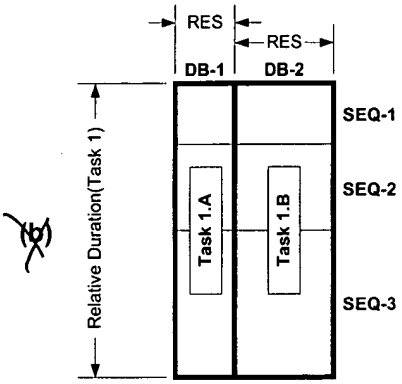
~~Entire Task searching 3 sequences against 2 databases~~

Task List
Task 1

Result List

Processor 1: Currently idle

Processor 2: Currently idle



~~(b)~~

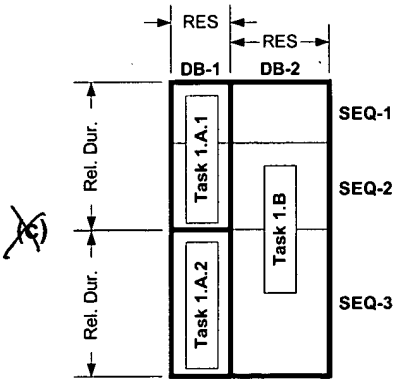
~~Processor 1 divides Task~~ 1 ~~vertically (Flowchart Box~~ B); ~~keeps Task 1.A~~

Task List
Task 1.B

Result List

Processor 1: Done dividing Task 1.B. About to work on Task 1.A

Processor 2: Currently idle. About to work on Task 1.B



~~(c)~~

~~Processor 1 divides Task~~ 1.A ~~horizontally (Box C); keeps~~ and ~~begins executing~~ Task 1.A.1

Task List
Task 1.A.2

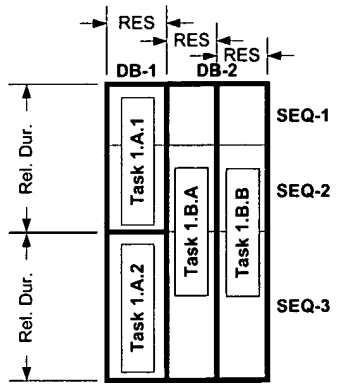
Result List

Processor 1: Done dividing Task 1.A. About to work on Task 1.A.1

Processor 2: Currently dividing Task 1.B

Annotated Marked Up Drawings

Figure 3 (Part 3 of 7)



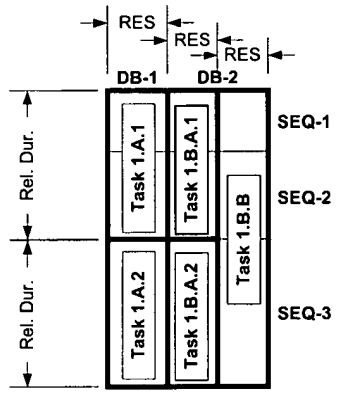
Processor 2 divides Task 1.B vertically (Box B); keeps Task 1.B.A

Task List
Task 1.A.2
Task 1.B.B

Result List

Processor 1: Executing Task 1.A.1

Processor 2: Done dividing Task 1.B; about to divide Task 1.B.A



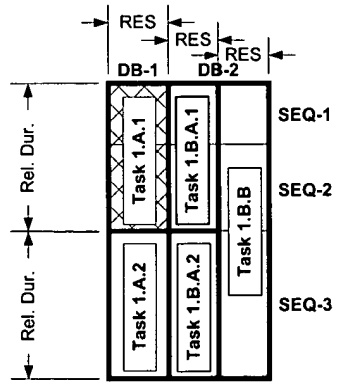
Processor 2 divides Task 1.B.A horizontally (Box C); keeps and begins executing Task 1.B.A.1

Task List
Task 1.A.2
Task 1.B.B
Task 1.B.A.2

Result List

Processor 1: Executing Task 1.A.1

Processor 2: Done dividing Task 1.B.A; about to execute Task 1.B.A.1



Processor 1 completes Task 1.A.1 (Box D); marks it READY (Box A)

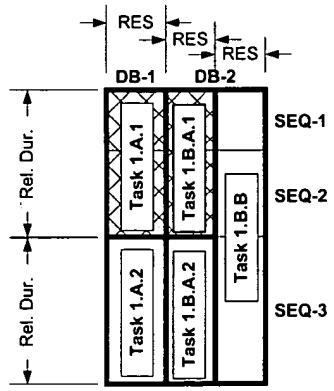
Task List
Task 1.A.2
Task 1.B.B
Task 1.B.A.2

Result List
Task 1.A.1

Processor 1: Done executing Task 1.A.1; about to execute Task 1.B.A.2

Processor 2: Done dividing Task 1.B.A; about to execute Task 1.B.A.1

Figure 3 (Part 4 of 7)



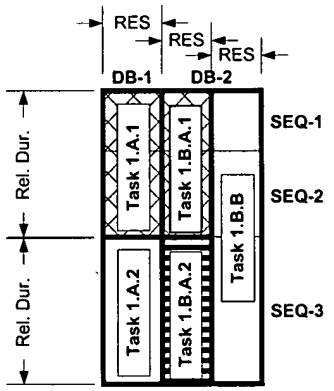
(g)

Processor 2 completes Task 1.B.A.1 (Box D); marks it READY (Box A)

Task List	Result List
Task 1.A.2 Task 1.B.B	Task 1.A.1 Task 1.B.A.1

Processor 1: Executing Task 1.B.A.2

Processor 2: Done executing Task 1.B.A.1; about to execute Task 1.A.2



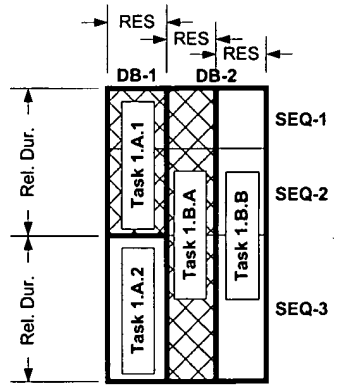
(h)

Processor 1 completes Task 1.B.A.2 (Box D)

Task List	Result List
Task 1.B.B	Task 1.A.1 Task 1.B.A.1

Processor 1: Done executing Task 1.B.A.2; about to merge with result of Task 1.B.A.1

Processor 2: Executing Task 1.A.2



(i)

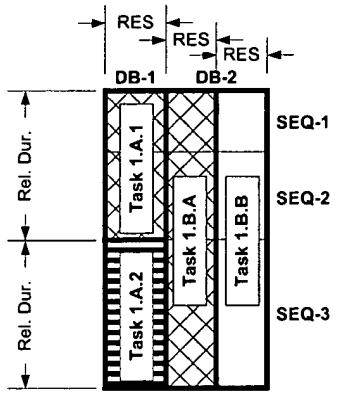
Processor 1 merges result for Task 1.B.A.2 with result for Buddy Task 1.B.A.1, thereby computing result for Parent Task 1.B.A (Box E); marks Task 1.B.A READY since Buddy Task 1.B.B is not READY

Task List	Result List
Task 1.B.B	Task 1.A.1 Task 1.B.A

Processor 1: Done forming result for Task 1.B.A; about to divide Task 1.B.B

Processor 2: Executing Task 1.A.2

~~Figure 3 (Part 5 of 7)~~



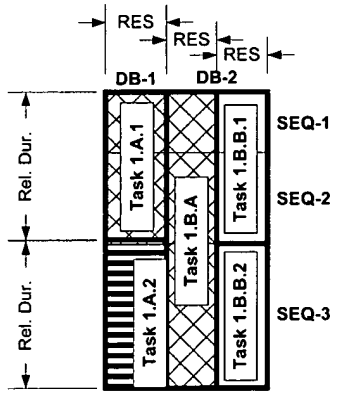
~~Processor 2 completes Task 1.A.2 (Box D)~~

Task List

Result List
Task 1.A.1
Task 1.B.A

Processor 1: Dividing Task 1.B.B

Processor 2: Done executing Task 1.A.2; about to merge with result of Task 1.A.1



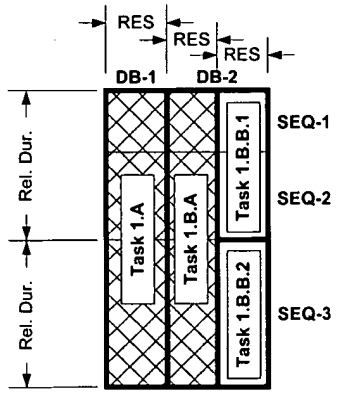
~~Processor 1 divides Task 1.B.B horizontally (Box C), keeps Task 1.B.B.1~~

Task List
Task 1.B.B.2

Result List
Task 1.B.A

Processor 1: Done dividing Task 1.B.B; about to execute Task 1.B.B.1

Processor 2: Merging results of Task 1.A.1 and Task 1.A.2



~~Processor 2 merges result for Task 1.A.2 with result for Buddy Task 1.A.1, thereby computing result for Parent Task 1.A (Box E); marks Task 1.A READY, since its Buddy Task 1.B is not READY.~~

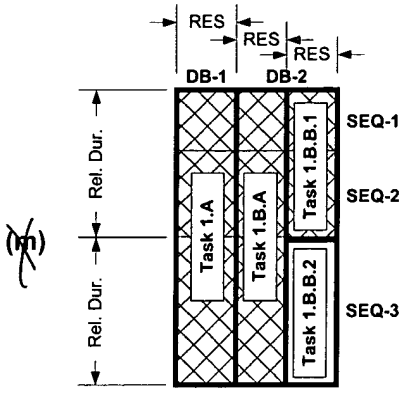
Task List
Task 1.B.B.2

Result List
Task 1.B.A
Task 1.A

Processor 1: Executing Task 1.B.B.1

Processor 2: Done forming result for Task 1.A; about to execute Task 1.B.B.2

~~Figure 3 (Part 6 of 7)~~



(m)

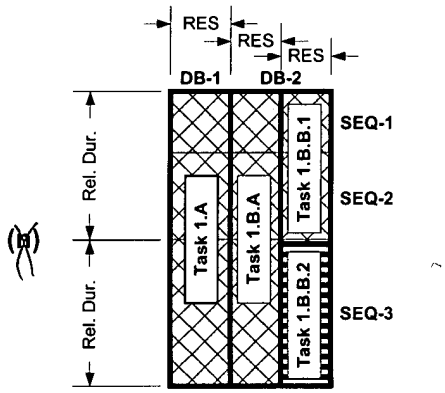
~~Processor 1 completes Task 1.B.B.1 (Box D); marks it READY (Box A) since Task 1.B.B.2 is not READY~~

Task List

Result List
Task 1.B.A
Task 1.A
Task 1.B.B.1

Processor 1: Done executing Task 1.B.B.1; about to become idle

Processor 2: Executing Task 1.B.B.2



(m)

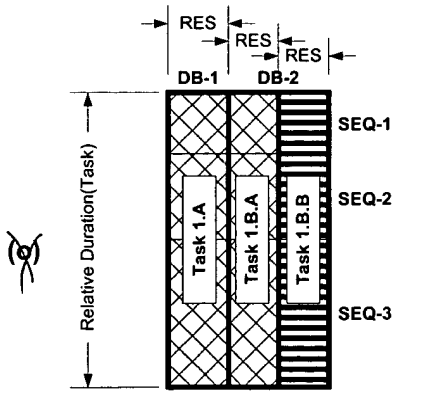
~~Processor 2 completes Task 1.B.B.2 (Box D)~~

Task List

Result List
Task 1.B.A
Task 1.A
Task 1.B.B.1

Processor 1: Idle

Processor 2: Done executing Task 1.B.B.2; about to merge with result for Task 1.B.B.1



(o)

~~Processor 2 merges result for Task~~ 1.B.B.1 with result for Buddy Task 1.B.B.2, thereby computing result for Parent Task 1.B.B (Box E)

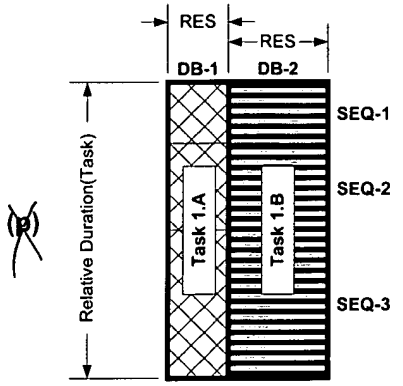
Task List

Result List
Task 1.B.A
Task 1.A

Processor 1: Idle

Processor 2: Done merging results for Task 1.B.B.1 and Task 1.B.B.2; about to merge with Task 1.B.A

Figure 3 (Part 7 of 7)



Task List

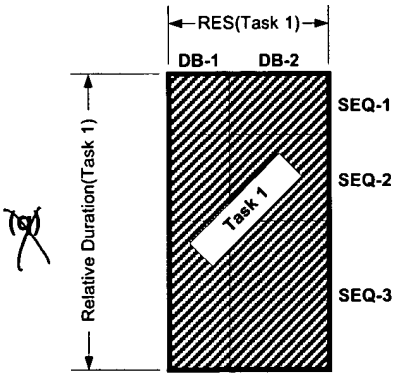
Result List

Task 1.A

Processor 1: Idle

Processor 2: Done merging results for Task 1.B.B and Task 1.B.A; about to merge with Task 1.A

Since Task 1.B.B's Buddy Task 1.B.A is READY, Processor 2 merges result for Task 1.B.B with result for Buddy Task 1.B.A, thereby computing result for Parent Task 1.B (Box E)



Task List

Result List

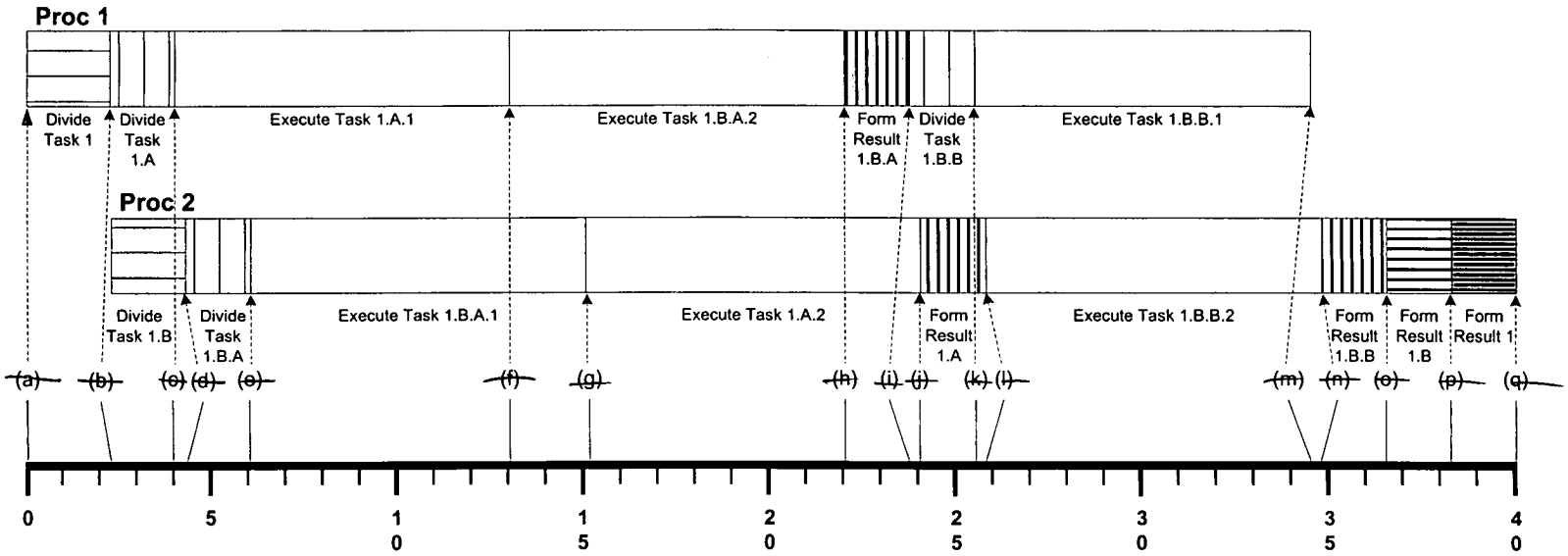
Task 1

Processor 1: Idle

Processor 2: Done with final merging; now idle

Since Task 1.B's Buddy Task 1.A is READY, Processor 2 merges result for Task 1.B with result for Buddy Task 1.A, thereby computing result for Parent Task 1 (Box E). This completes the computation, since Task 1 is the Entire Task and has no Buddy Task.

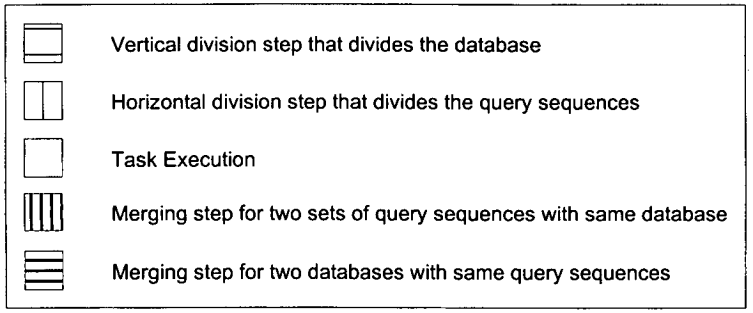
Figure 4
Processor Activity During Example Execution of Method



Time Scale for Computation (Letters refer to subfigures of Figure 2)

This figure contains timelines that illustrate the activities carried out on each of two processors during application of the method of the invention to compute the result of the entire searching task as illustrated in Figure 3. The markings for each activity are described below. In this figure, the fill pattern for each activity reflects the type of activity, while the fill coloring is used to indicate related activities. (Neither the fill patterns nor the fill colorings match those in Figure 3.)

The time scale does not represent actual time, but is intended to portray possible relative times at which various activities might take place. The time scale is consistent with the details of Figure 3 and with a possible operation of actual computer software implementing the method. The timelines are correlated with Figure 3 according to the parenthesized letters (e.g., "(a)") that correspond to the similarly designated subfigures of Figure 3.



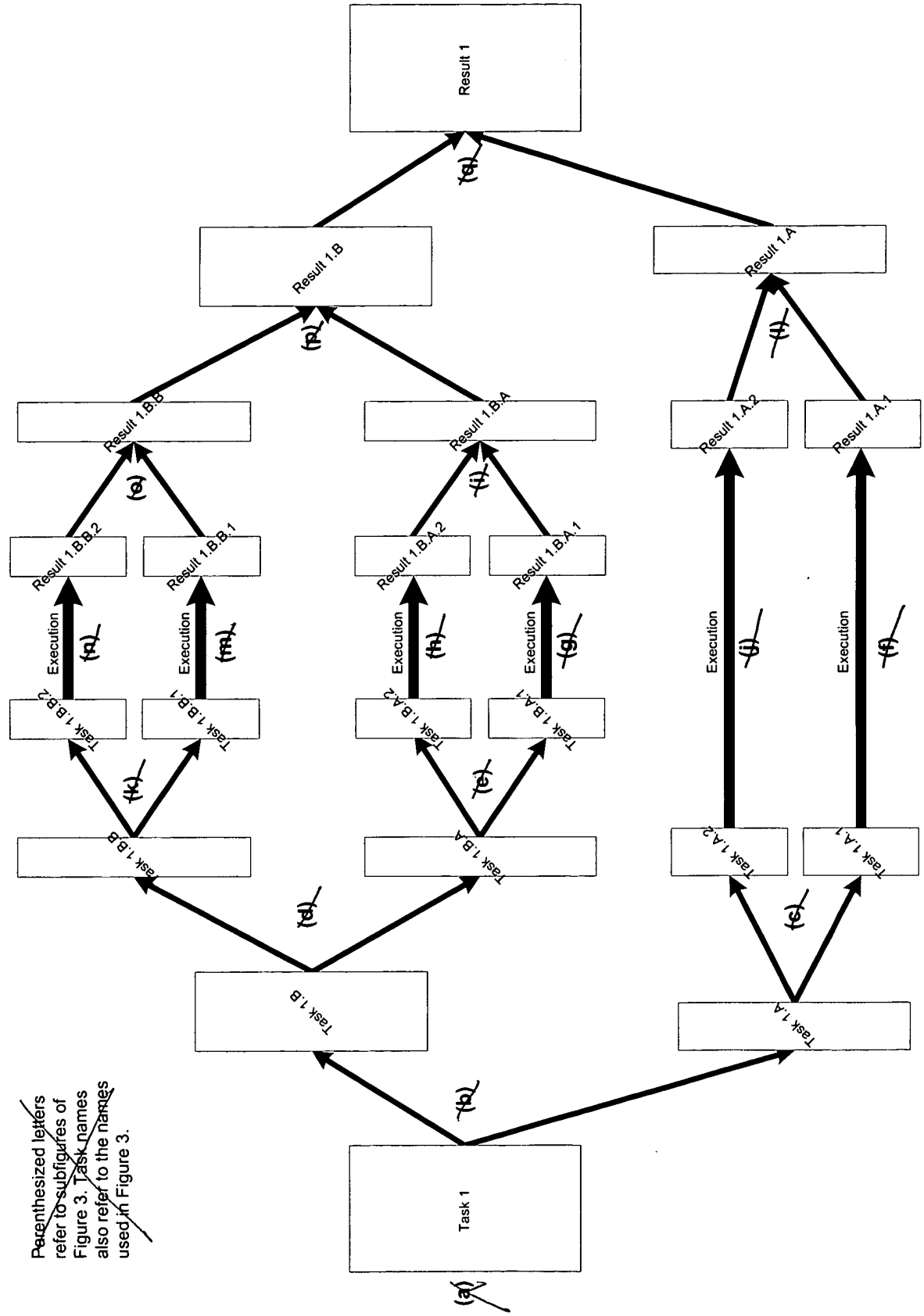
Annotated Marked Up Drawings

Attorney Docket No.:053706-5001-01

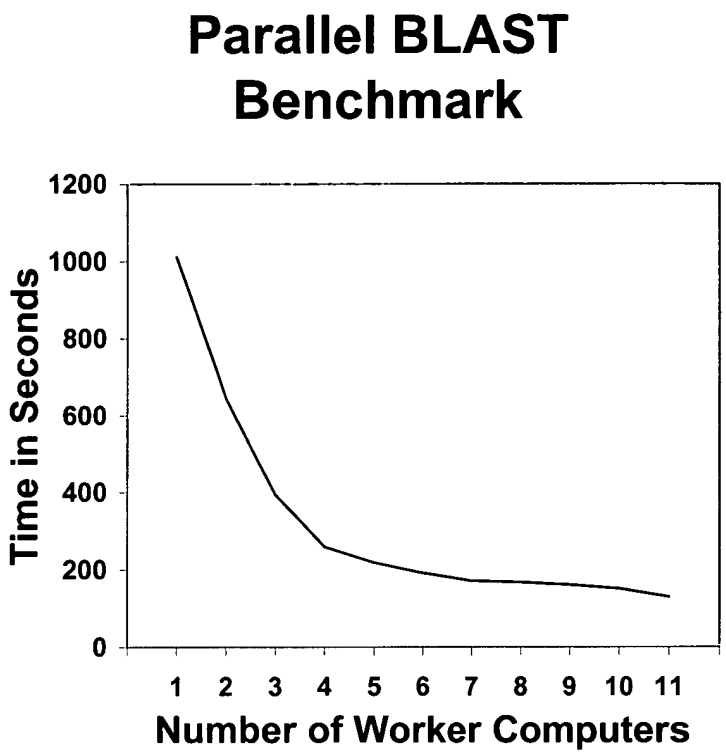
Annotated Marked Up Drawings

Figure 5

Representation of Task Division and Result Merging for Example of Figure 3



~~Figure 6(a): Plot of Times for Benchmark Example~~



~~Figure 6(b): Plot of Speedup Values for Benchmark Example~~